Annual External Evaluation Report

PathTech: Successful Academic and Employment Pathways in Advanced Technologies

NSF Award #1104214

August 31, 2013

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1. Overview of PathTech and the External Evaluation

1.1 About the PathTech Project

The Successful Academic and Employment Pathways in Advanced Technologies (PathTech) project is funded through a grant from the National Science Foundation (NSF) Directorate for Education and Human Resources (DEHR) under the Advanced Technological Education (ATE) program (NSF Award #1104214). The NSF ATE program promotes the improvement of education, particularly at two-year colleges, for science and engineering technicians entering into high-technology fields. The ATE program supports different types of activities, including the development of curriculum, educator professional development, career pathways, articulation between two-year and four-year programs for potential educators, and research to add to the understanding of various aspects of technician education.

PathTech is a research study designed to examine the progression of students from high school into advanced technology programs, specifically engineering technology (ET), at community colleges and into the workforce. This study is being conducted over four years between September 1, 2011 and August 31, 2015. Grant funds for this project period total $1,196,790.

The NSF ATE grant for the PathTech project was awarded to the University of South Florida (USF), which established a collaboration of higher education institutions in Florida, including researchers from the Departments of Sociology and Anthropology at USF, the Florida Advanced Technological Center (FLATE) at Hillsborough Community College (HCC), Polk State College (PSC), St. Petersburg College (SPC), and State College of Florida (SCF). Dr. Will Tyson (USF – Sociology) is the principal investigator, and Dr. Marie Boyette (FLATE at HCC) has been serving as co-principal investigator since the project inception.[1] In Year 1 of the grant, the project leaders expanded the research team to include university students and other research staff to contribute to the PathTech project. In January 2013, Dr. Lakshmi Jayaram (USF – Sociology) was added to the project as the lead qualitative investigator and Dr. Edward Fletcher (USF – Education) was added as a quantitative investigator. Dr. Chrystal Smith (USF – Anthropology) is the PathTech program manager.

1.1.1 PathTech Research Design and Methodology

The PathTech project continues to work toward contributing to a growing body of knowledge on advanced technician education and to the overall mission of the NSF ATE program by:

- increasing understanding of recruitment and pathways into ET programs,
- providing information to improve the education of engineering technicians,
- discovering promising practices and recommending interventions at high schools to increase the visibility of ET programs at local community colleges, and
- providing information about practices that produce more qualified science and engineering technicians to meet workforce demands.

RESEARCH QUESTIONS

The purpose of the PathTech research study is to answer two main research questions, each with three subquestions:

[1] Dr. Kathryn Borman (USF) served as another co-principal investigator until her retirement at the end of the Spring 2013 semester.

1. Who enrolls in ET community college programs out of high school?
    a. How are student demographic and academic characteristics related to ET enrollment?
    b. How do students learn about ET programs (i.e., outreach)?
    c. How can the pathway from high school into ET programs be improved?
2. How do ET students benefit from enrolling (in degree programs) and earning degrees through these programs?
    a. What are the most critical steps in ET degree attainment from enrollment through gatekeeper courses and to the degree?
    b. How do these students become ET graduates?
    c. How do ET students differ from comparable students in their degree and employment outcomes?

These research questions continue to be the main focal points of all aspects of the research study, including the instruments that are used to collect qualitative data from various stakeholders and the quantitative analysis plans.

METHODOLOGY

PathTech is a mixed-method study that is employing both descriptive statistics and empirical analysis of verifiable quantitative data from state databases along with ethnographic (qualitative) methods. Quantitative analyses examine statewide trends in career academy participation and engineering technology enrollment. Quantitative data from the Florida Department of Education (FLDOE) PK-20 Education Data Warehouse (EDW), Florida Education & Training Placement Information Program (FETPIP), and from site visits are used to construct several indicators of high school preparation that predict enrollment into ET programs. The research team is analyzing retrospective data from students during Grades 9-12 to measure high school and post-secondary coursetaking, achievement, and degree attainment. Four cohorts of students who graduated from high school and entered into the full-time workforce or post-secondary schooling in 2007-08, 2008-09, 2009-10, 2010-11 will be tracked.

Qualitative analyses focus on four engineering technology programs housed at community college campus in the Tampa Bay region of Florida, as well as feeder high schools and local industry partners. Site visits are being conducted in this region, which contains a concentration of high school STEM career academies, STEM industry, and community colleges that offer advanced technology associates degrees.

1.1.2 PathTech Project Timeline

In Year 2 of the PathTech project, the research team was to conduct these activities, which included seven tasks in Year 1 that carried over into Year 2, as well as five tasks initially planned for Year 2:

Year 1 (tasks carried over into Year 2)

1. Create project brochure highlighting goals and purpose of study for stakeholders
2. Conduct pilot site visits to pilot test instruments in one high school, community college, and industry

3. Request additional Florida Department of Education (FLDOE) data updates
4. Carry out data preparation, descriptive analysis of current FLDOE data
5. Conduct propensity score analysis to create samples of students with equal propensity of being in a STEM-themed career academy and propensity score analysis at the school level to create pairs of schools with equal propensity of having a STEM-themed career academy in using Cohorts 1 and 2
6. Conduct a literature review on technician education
7. Write one paper for dissemination at a relevant conference and/or journal article for a peer reviewed journal

Year 2

1. Carry out site visits to:
    a. Four community colleges with AS degrees in ET
    b. Four high schools with engineering career academies
    c. Local industry partners that hire AS degreed engineering technicians
2. Conduct multivariate, multi-level analysis of ET enrollment based on student-level demographic and academic factors and school-level characteristics among students in STEM career academy propensity groups
3. Carry out data preparation, descriptive analysis of Florida Education & Training Placement Information Program (FETPIP) employment data and post-secondary academic outcomes
4. Conduct multivariate, multi-level analysis of the impact of enrollment in engineering technologies on early post-secondary outcomes among Cohorts 1 and 2 students who enrolled in ET programs and comparable students who did not
5. Write 1-2 papers for peer-review journal and/or conference presentations (e.g., AERA)

1.2 About the External Evaluation

The external evaluation of PathTech is being conducted by ICF International, led by Thomas Horwood as lead evaluator, Kristen Peterson as the lead analyst, and supported by Dr. Teresa Duncan and Dr. Katerina Passa. The external evaluation is intended to complement and support the efforts of the PathTech research team. The approach to external evaluation involves: (1) monitoring the progress of the various aspects of the project (e.g., outreach, data collection, quantitative analysis, qualitative analysis); (2) providing objective reviews of project instruments, protocols, analysis plans, and reports; and (3) serving as an external resource for technical advice.

This report serves as the second in a series of four annual evaluation reports and covers the second year of the implementation of the PathTech project. It serves as a mid-point update on the progress of the research project in meeting its goals, and includes cumulative updates for the first two years of the project. Data were collected for this report through conversations with the PathTech project team during monthly calls, an external evaluation database used to track monthly progress of project activities, through two evaluation site visits to USF and the ET Forum, and through review of project documents (e.g., grant application, research instruments, research protocols, reports).

2. External Evaluation Findings – Year 2

This annual external evaluation report #2 assesses the PathTech project team's progress according to the workplan during the first year of the grant. The Year 2 project period was September 1, 2012 to August 31, 2013. Exhibit 1 shows the activities conducted in Year 2 for the seven Year 1 tasks that carried over into Year 2, as well as an update on the status of these tasks at the end of Year 2. Of the seven Year 1 tasks, one involves marketing the PathTech project (an ongoing task), one is for qualitative data collection protocols, three are for quantitative data collection and analysis, one involves literature reviews, and one involves dissemination.

Exhibit 1: Status of Year 1 PathTech Tasks in Year 2 (September 1, 2012-August 31, 2013)

Year 1 Task	Activities Completed – Year 1	Status at End of Year 1	Activities Completed – Year 2	Status at End of Year 2
1. Create project brochure highlighting goals and purpose of study for stakeholders	▪ PathTech web site landing page was developed and includes a brief project overview	In Progress	▪ Built social media presence through Facebook and Twitter ▪ Updated web site with project information, staff biographies and event photographs	In Progress
2. Conduct pilot site visits to pilot test instruments in one high school, community college, and industry	▪ Conducted the pilot site visits at one community college and one ET company ▪ Conducted 12 pilot interviews with community college students at St. Petersburg College on April 25, 2012 ▪ Conducted pilot interviews with one employee and one employer/recruiter on-site at the ET company location ▪ Trained 14 student interviewers in ethical issues and fundamental interview strategies ▪ Conducted one-on-one training sessions on analytic strategies after interviews were transcribed	In Progress	▪ All remaining community college interviews were transcribed, coded and analyzed ▪ Pilot interviews were conducted with 15 Middleton High School students in February and March 2013. ▪ Graduate students were trained to code and analyze transcription data. ▪ Interviews were transcribed in April 2013 and coded and analyzed in May 2013.	Complete
3. Request additional Florida Department of Education (FLDOE) data updates	▪ Submitted data requests to FLDOE	Delayed	▪ Submitted additional data requests to FLDOE ▪ FLDOE data was obtained, but missing the race variable	Complete
4. Carry out data preparation, descriptive analysis of current FLDOE data	▪ See Task 3	Delayed	▪ Data was examined and cleaned, although is of limited use without race variable ▪ Exploring access to National Academy Foundation data	In Progress

Year 1 Task	Activities Completed – Year 1	Status at End of Year 1	Activities Completed – Year 2	Status at End of Year 2
5. Conduct propensity score analysis to create samples of students with equal propensity of being in a STEM-themed career academy and propensity score analysis at the school level to create pairs of schools with equal propensity of having a STEM-themed career academy in using Cohorts 1 and 2	▪ Created analysis plans based on known variables expected to be collected ▪ See Task 3	Delayed	▪ No action	Delayed
6. Conduct a literature review on technician education	▪ Conducted a literature search to collect articles and other materials in three topic area: high schools, community colleges, and industry ▪ Wrote three literature reviews, which will be updated on a regular basis throughout the grant project period to continually inform the project	Complete	▪ Additional literature reviews were written about the quality of phone versus in-person interviews and on school-level data and racial disparity.	Complete
7. Write one paper for dissemination at a relevant conference and/or journal article for a peer reviewed journal	▪ No action	Not Started	▪ Integrated into Year 2 disseminations plans	In Progress (See Year 2, Task 5 in Exhibit 2)

Of the six Year 1 tasks that carried over to Year 2,[2] two are complete, three are in progress, and one is delayed. The marketing task (Task 1) is in progress and will continue to be ongoing throughout the evaluation. The team made the most progress on the task to develop and pilot the qualitative data collection protocols (Task 2) in Year 1, as the team was able to pilot test the instruments in a high school in Year 2. The team was able to make progress in Year 2 on the three quantitative data collection and analysis tasks. They were able to obtain data from FLDOE, prepare data for analysis, and submit additional data requests. Propensity score matching is delayed still at the end of Year 2 but this will be conducted in the next two years. The status of the literature review task is was complete at the end of Year 1, but the literature reviews continued to be updated to inform all tasks in Year 2. Additional literature reviews were conducted by the team. The dissemination task is in progress, and the Year 1 task has essentially folded into the Year 2 dissemination task since disseminating findings is a key task each year. The process of submitting abstracts to journal editors and having them approved by peer reviewers takes more time than was originally anticipated.

In addition to the Year 1 tasks that carried over to Year 2, Exhibit 2 shows the activities completed, status, and notes about each of the five tasks planned for Year 2 of the grant project period. Of the five major Year 2 tasks, one is for qualitative data collection, three are for quantitative data collection and analysis, and one involves dissemination.

[2]Task 6 was complete at the end of Year 1

Exhibit 2: Status of Year 2 PathTech Tasks in Year 2 (September 1, 2012-August 31, 2013)

Year 2 Task	Activities Completed – Year 2	Status at End of Year 2	Notes
1a. Carry out site visits to 4 community colleges with AS degrees in ET	▪ Developed all participant consent forms and interview protocols based on pilot experience ▪ Developed demographic questionnaire for community college students and employee survey for industry interviews ▪ Recruited 4 community college partners and are actively recruiting participants through AutoCAD courses and online tool	In Progress	▪ Will carry over into Year 3 ▪ Will kick off interviews with recruited participants as soon as the 2013-14 school year begins
1b. Carry out site visits to 4 high schools with engineering career academies	▪ Developed all participant consent forms and interview protocols based on pilot experience ▪ Recruited two high schools and looking at other STEM magnets	In Progress	▪ Connections were made with Middleton High School, Sarasota-Manatee High School and a Maritime Academy ▪ Will carry over to Year 3 due to difficulties recruiting participating high schools in Year 2
1c. Carry out site visits to local industry partners that hire AS degreed engineering technicians	▪ Developed all participant consent forms and interview protocols based on pilot experience ▪ Developed demographic questionnaire for industry interviews ▪ Recruited participants during the annual ET Forum ▪ Conducted 10 interviews with industry staff in April and May 2013 ▪ Interviews were transcribed ▪ Coding and analysis are in progress	In Progress	▪ Using a case analysis approach
2. Conduct multivariate, multi-level analysis of ET enrollment based on student-level demographic and academic factors and school-level characteristics among students in STEM career academy propensity groups	▪ Initial analysis being conducted with FLDOE data	In Progress	▪ Delayed due to Year 1 delay in obtaining data ▪ Race variable missing; exploring alternate datasets
3. Carry out data preparation, descriptive analysis of Florida Education & Training Placement Information Program (FETPIP) employment data and post-secondary academic outcomes	▪ Data obtained and prepared for analysis	In Progress	▪ Also determined to pull in data from other publicly available datasets

Year 2 Task	Activities Completed – Year 2	Status at End of Year 2	Notes
4. Conduct multivariate, multi-level analysis of the impact of enrollment in engineering technologies on early post-secondary outcomes among Cohorts 1 and 2 students who enrolled in ET programs and comparable students who did not	▪ Analysis plans developed	In Progress	
5. Write 1-2 papers for peer-review journal and/or conference presentations (e.g., AERA)	▪ Submitted abstract using FLDOE data to *Educational Evaluation and Policy Analysis* journal on using state longitudinal data to address policy issues ▪ Paper drafted using the pilot data, planning to submit to the *Youth & Society* journal	In Progress	▪ Includes carryover from Year 1 Task 7 ▪ Also presented at the Florida Forum on Engineering Technology (ET Forum) the Annual Meeting of the Southern Sociological Society and made connections with important professional organizations and individuals like the National Career Academy Coalition

All of the five major Year 2 tasks are in progress as of the end of Year 2. The team has made significant progress on preparing for and carrying out site visits and conducting interviews with community college students and faculty/administrators, high school students, and industry partners (Task 1 a-c). This success will help the team continue this work into Year 3, as the connections have been made to ensure buy-in from the various stakeholder groups. The team has made progress on the quantitative data collection and analysis by obtaining data from FLDOE, planning to merge data from other publicly available datasets, and developing analysis plans. The team is preparing abstracts and papers that will help them with the dissemination task (Task 5). Specifically, they are preparing submissions to the *Educational Evaluation and Policy Analysis* and *Youth & Society* journals. Lastly, the team has been successful in conducting outreach to promote PathTech at places like the Florida Forum on Engineering Technology (ET Forum) and with organizations like the National Career Academy Coalition (NCAC).

3. Conclusions

Year 2 of the PathTech project built upon the success of Year 1 when the focus was on project startup. In Year 2, the PathTech project team started to hit its stride in terms of carrying out the work of the project. The team has continued to market PathTech to key stakeholders who are both important to completing the project as well as to those in the field who have a stake in the outcomes of the study. This has generated excitement about PathTech in Florida and beyond. While many of the Year 1 and Year 2 tasks continue to be in progress at the mid-point of the project, this is mostly due to shifting priorities and positive unanticipated factors that are associated with implementing a study of this size and scope. Through their outreach to various stakeholder groups, the PathTech team has been able to put their fingers on the pulse of these groups to understand how to go about carrying out their research and devising a plan to do so. As Year 3 begins, it will be important for the PathTech team to continue to look across all tasks in all four years to devise a plan to ensure that all aspects of the study will be completed.

4. Next Steps in the External Evaluation

Evaluation activities over the next two years of the NSF grant period will include: (1) ongoing monitoring of the progress of the project against project timelines; (2) objective review of data collection protocols, site visit criteria, and quality of the propensity score matching results; (3) evaluation of the interpretability of course trajectories between the cohorts (years 3 and 4); (4) review of the replicability of the analyses conducted; and (5) provide recommendations for future directions.

In addition, the evaluation team will continue to serve as external resources for technical advice, and will provide commentaries and written reviews of the project's various activities. In addition, the evaluation team will maintain regular, monthly contact with Dr. Tyson and the rest of the project team via teleconferences and email, bringing in other members of the external evaluation team as needed. The evaluation team will continue to prepare monthly monitoring memos, in which the research team's progress towards project milestones is assessed and suggestions for addressing challenges are provided.

In each subsequent year, the external evaluation team will prepare an annual evaluation report like this one summarizing evaluation activities and findings. Each annual evaluation report will build off of the previous report, and will be submitted to NSF as part of the annual reporting requirements, as evidence of the quality of the project's quality assurance procedures.